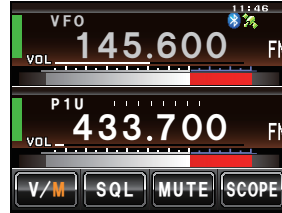**Signal Search**

10 Press [F]

The display will return to the previous screen, and the memorized frequency and memory channel number will be displayed.

Lower frequency P1L

Upper frequency P1U

Scanning the programmable memory

1 Switch to the memory mode

2 Recall the PMS memory of the upper frequency or lower frequency

3 Press [F] briefly

The function menu will be displayed.

4 Touch **[SCAN]**

Tip When **[SCAN]** is not displayed in the function menu, touch **[BACK]** or **[FWD]** to switch the menu.

The programmable memory scan will be started.

Tips • The scan can also be started by pressing the **[UP]** or **[DWN]** button on the microphone for one second or longer.

• When a signal is received, the scanning stops for three seconds and then the scanning starts again.

• To stop the scanning, either touch **[SCAN]** or press the microphone **[PTT]** button (the radio will not transmit in this case).

• The squelch level may be adjusted using the following procedure during scanning. Touch **[SQL]** → Turn ⊙

Caution

When the upper and lower frequencies are not set correctly, the programmable memory scan will not work.

Scanning

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Monitoring the Home Channel

This radio is equipped with a dual receive function (also known as dual watch (DW)) which checks for a signal on the home channel approximately every three seconds while monitoring or scanning. If a signal is detected, the home channel is received for five seconds, and then monitoring or scanning with dual receive is resumed.

Example: When checking the home channel while receiving "145.500 MHz"

Reception frequency

Monitor the home channel at intervals of about three seconds.
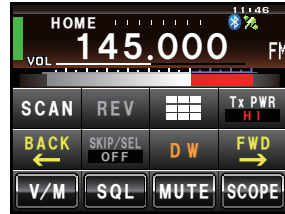
When the home channel is busy, the radio receives the signal for five seconds and then starts the dual receive again.

Caution

When shipped from the factory, the default frequency in the home channel of 144 MHz Band is set to 144.000 MHz while the default frequency in the home channel of 430 MHz Band is set to 430.000 MHz. These channels may be changed to a favorite operating frequency (☞P.64).

Using the dual receive

1 Tune in to the memory channel or a desired VFO receive frequency using 🎛️

2 Press 🔘 briefly

The function menu will be displayed.

3 Touch **[DW]**

Tip When **[DW]** is not displayed in the function menu, touch **[BACK]** or **[FWD]** to switch the menu.

Dual receive will start, and the home channel frequency will be received approximately every three seconds.
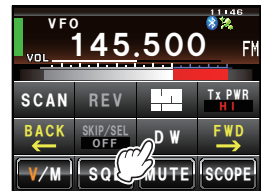
When a signal is detected on the home channel, it will continue to be received until the signal disappears.

● **To cancel the dual receive**

Touch **[DW]** again.

Scanning

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Monitoring the Home Channel

▌ **Setting the restart condition of dual receive**

The dual receive restart condition when the home channel signal is detected can be selected from the following two ways.

(1) Restarts dual receive after five seconds have passed (AUTO).

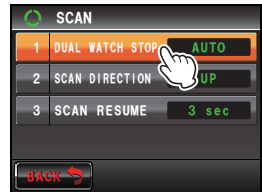(2) Stops dual receive and continue to receive the home channel (HOLD).

1 Press 𝖣𝖨𝖲𝖯 for one second or longer
The set-up menu will be displayed.

2 Touch **[SCAN]**
The menu list will be displayed.
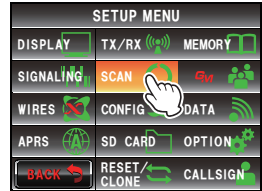
3 Touch **[1 DUAL WATCH STOP]** to select the restart condition
The setting switches between "AUTO" and "HOLD" each time it is touched.
Tip Factory default value: AUTO

4 Press 𝖣𝖨𝖲𝖯 for one second or longer
The dual receive restart condition will be set and the display will return to the previous screen.

This radio is equipped with an internal GPS reception unit to receive and display the position information at all times. The position information can be used as in the following example.

Save the position information in the memory and use it for navigation purposes
☞ Refer to "Using the backtrack function" (Page 95)

Save the stations with frequent communications and checks whether they are within the sphere of communications
☞ Refer to the separate "Operating Manual GM Edition"

Exchange position information and messages through data communications with other stations
☞ Refer to the separate "Operating Manual APRS Edition"

What is GPS?

GPS or Global Positioning System is a satellite location system to determine the current position on earth. It is a military system developed by the US Department of Defense with approximately 30 GPS satellites circumnavigating the earth at an altitude of about 20,000 km, When signals from three or more satellites in space are received, the current position information (longitude, latitude, altitude etc.) may be determined within an accuracy of several meters. The accurate time can also be received from the atomic clock built into the GPS satellite.

Positioning Using GPS

1 Press 🔘 for one second or longer to switch on the power

The satellite search will begin and the "🛰" icon will be displayed at the top right of the screen.

Tips • It may take several minutes to capture the satellites.
• When three or more satellites cannot be captured, the icon display will disappear. In this case, positioning is not possible and the position information cannot be used.
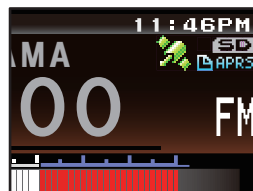
Positioning Using GPS

About GPS positioning

Positioning refers to the calculation of one's own position from the satellites orbit information and the transmission time of the radio waves. Positioning requires that three or more satellites be acquired. When positioning cannot be carried out properly, move to an open space as far away from buildings as possible and where there are fewer obstructions.

●**About the error**

Depending on the surrounding environment of the receiver location, an error of several hundred meters may occur. Although positioning is possible using only three satellites, depending on the positioning conditions, the positioning accuracy may become worse, or may no longer be possible under the following conditions:

• Between high rise buildings, narrow roads between buildings, indoors and under the shade of buildings, below high voltage lines and underneath overhead structures, between trees and shrubs such as in forests and woods, inside tunnels and underground, when used behind a solar-energy reflecting glass, locations where a strong magnetic field occurs

●**When not using the radio for a long period of time**

When using the GPS function for the first time after purchasing the FTM-400XDR/DE transceiver, and when turning it on after It has not been used for a long period time, positioning may take several minutes in order to search for the satellites. Also, when using the device again several hours after switching off the power, positioning may take several minutes in order to search for the satellites.

▌ Positioning using an external GPS device

Commercial GPS receive devices can also be connected to the [EXT GPS] jack on the side of the controller.

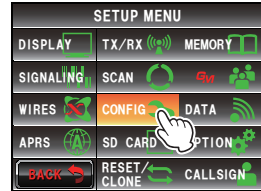The [EXT GPS] plug connector is illustrated below.
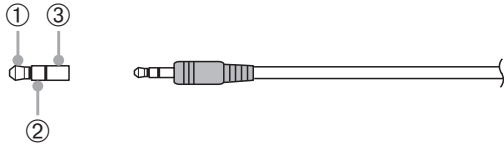
① TXD (serial data output [transceiver → external device])

② RXD (serial data input [transceiver ← external device])

③ GND

Positioning Using GPS

1 Switch off the power to the radio

2 Plug the connector of the external device into the [EXT GPS] jack on the side of the controller unit.

EXT GPS
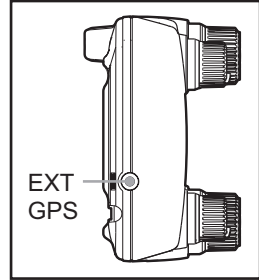
3 Switch on the power to the radio

4 Press 🖫 for one second or longer
The set-up menu will be displayed.

5 Touch **[CONFIG]**
The menu list will be displayed.

SETUP MENU

DISPLAY	TX/RX ((•))	MEMORY
SIGNALING	SCAN	
WIRES	CONFIG	DATA
APRS	SD CARD	OPTION
BACK	RESET/CLONE	CALLSIGN

6 Touch **[17 GPS DEVICE]** to select "EXTERNAL"
Each time this symbol is touched, the setting will switch between "INTERNAL" and "EXTERNAL".

17 GPS DEVICE INTERNAL
BACK

7 Press 🖫 for one second or longer
Return to the previous screen.

When the external device captures three or more satellites, the "📡" icon will be displayed on the top right of the screen.

Tips

• When connecting to an external GPS device, refer to the operating manual of the connected device as well.
• When using an external GPS device, keep the radio away from the external GPS device.
• When using an external GPS device, the data from the in-built GPS will become invalid.

Using the GPS Function

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Positioning Using GPS

▌ Checking the satellite capture status

The satellites acquired at the current location and the strengths of the signals can be observed on the radar-like screen.
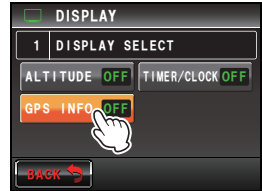
1 Press 📟 for one second or longer

The set-up menu will be displayed.

2 Touch **[DISPLAY]**

The menu list will be displayed.
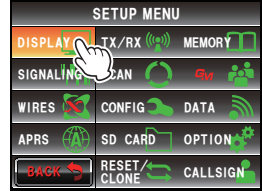
3 Touch **[1 DISPLAY SELECT]**

The screen for setting the various screens on and off will be displayed.
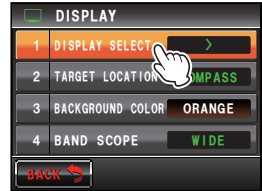
4 Touch **[GPS INFO]** to select "ON"

Each time this symbol is touched, the setting will switch between "OFF" and "ON".

5 Press 📟 for one second or longer

The display will return to the previous screen.

6 Press 📟 twice briefly

The radar-shaped GPS screen will be displayed and the acquired GPS satellite number and signal strength icon will be displayed.

The brighter the color of the icon, the stronger is the signal strength.
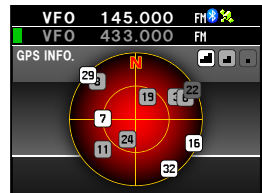
Tips • When the Altitude display screen and Timer/Clock screen are both "ON", the screen will change in the following order each time 📟 is pressed.

Normal frequency display → Compass/Lat&Lon display screen → Altitude display screen → Timer/Clock screen → GPS screen

• When connecting an external GPS device, satellite information may not be output depending on the GPS device (in this case, the icon will not be displayed).
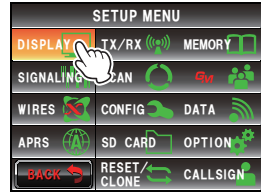
Displaying the position information

Displaying the current position information of your station

1 Press 🔲 for one second or longer
The set-up menu will be displayed.

2 Touch **[DISPLAY]**
The menu list will be displayed.

3 Touch **[2 TARGET LOCATION]** to select "NUMERIC"
Each time this is touched, the setting will switch
between "COMPASS" and "NUMERIC".

4 Press 🔲 for one second or longer
The display will return to the previous screen.

5 Press 🔲 briefly
The latitude and longitude display screen will be
displayed.

6 Touch **[MY]**
The latitude and longitude of your station will be
displayed in numerical figures.
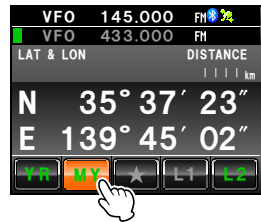
> **Tip** When the Altitude display screen and Timer/Clock screen
> are both "ON", the screen will change in the following
> sequence each time 🔲 is pressed.
> Normal frequency display → Compass/Lat&Lon display
> screen → Altitude display screen → Timer/Clock screen
> → GPS screen

Displaying the position information of the partner station in the digital mode

In the C4FM digital V/D mode, the position and direction to the partner station can be
displayed in real time during the communication. The position information obtained from
the GPS is transmitted at the same time as the voice signal.

1 Switch the communication mode to AMS (auto mode select function) or digital mode,
or activate the GM function

> **Tip** Refer to "Using the GM function" (☞P.99) on the basic method of using the GM function.

2 Switch to the latitude and longitude display screen

3 Touch **[YR]**
The latitude and longitude of the partner station will be displayed in numerical
figures.

Using the GPS Function

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Positioning Using GPS

Explanation of the position information screen

Example of a display of your own station position


① Latitude
Displayed as "X DD°MM'SS""
  X: N (north latitude) / S (south latitude)
  DD: 0 - 90 (degrees)
  MM: 0 - 59 (minutes)
  SS: 0 - 59 (seconds)
  Example: N 35°37' 23" (latitude 35 degrees
          37 minutes & 23 seconds)
  Tip The "DD°MM'SS"" and "DD°MM.
        MM'" will switch each time the number
        section is touched.

② Longitude
Displayed as "X DDD°MM'SS""
  X: E (east longitude) / W (west longitude)
  DDD: 0 - 180 (degrees)
  MM: 0 - 59 (minutes)
  SS: 0 - 59 (seconds)
  Example: E 139°45' 02" (east longitude 139
          degrees 45 minutes 02 seconds)
  Tip The "DDD°MM'SS"" and "DDD°MM.
        MM'" will switch each time the number
        section is touched.

Example of a display of a partner station position
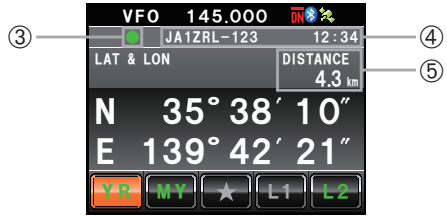
③ Position information status display
The status display will indicate that the data received contains position information. The status display will blink when the GM function is activated.
  Tip Refer to the separate Operating
        Manual GM Edition for the details
        on the GM function (download the
        manual from the YAESU website).

④ Partner station call sign and time of receipt

⑤ Distance to a partner station

Tip

Use **[APRS]** → **[12 APRS UNITS]** in the set-up menu to change the display units of the various data.

Using the GPS Function
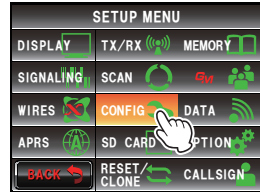
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Recording the position information (GPS log function)

The position information of your own station can be recorded (saved) in a micro-SD card on a regular basis.

1 Press 🖥 for one second or longer

The set-up menu will be displayed.

**2** Touch **[CONFIG]**

The menu list will be displayed.

3 Select **[18 GPS LOG]** and touch the screen

The screen for selecting the recording interval and switching the GPS log function ON and OFF will be displayed.

4 Touch **[ON]**

The interval timing will be displayed in green characters.

Tips • The position information will not be recorded when "OFF" is selected.
• Factory default value: OFF
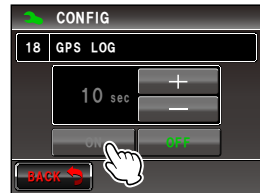
5 Touch **[+]** and **[-]** to select the interval timing

Each time the screen is touched, the interval timing will change in the following sequence. The interval timing can be selected from the following six levels.

"1 sec" "2 sec" "5 sec" "10 sec" "30 sec" "60 sec"

Tip Factory default value: 10 sec

6 Press 🖥 for one second or longer

The interval timing for recording the position information will be set and the display will return to the previous screen.

The recording of the position information at the set interval will also be started.

Tips
• The position information will continue to be recorded until the power to the radio is switched off or when "OFF" is selected in Step 4.
  Recording will be restarted under the same file name when the power to the radio is turned on again, or when the recording interval is selected one more time in Step 5.
• The position data will be saved under the filename "GPSyymmdd.log".
  "yymmdd" shows the record start time in "yy" (year), "mm" (month) and "dd" (day) format.

▌ **Checking the route using a personal computer**

The route can also be displayed with commercial map software using the log data of the saved position information.

1 Switch off the power to the radio

2 Remove the micro-SD card

3 Insert the micro-SD card into the personal computer card reader.

4 Open the "FTM400D" folder contained on the micro-SD card

5 Open the "GPSLOG" folder

The data is saved under the file name "GPSyymmdd.log".

"yymmdd" refers to the recording start year (yy), month (mm), and day (dd).

6 Import the data into the commercial map software

The route will be displayed on the map.

Tips

- Refer to the operating manual of the map software that you are for instructions to import and display the route data on the map.
- The position information can also be used by connecting the radio directly to a computer ("Connecting to an external device" ☞P.155)).

Measuring the altitude

The changes in the altitude depending on the altitude of the current position and distance travelled can also be displayed in a graph.

1 Press 🔲 for one second or longer

The set-up menu will be displayed.

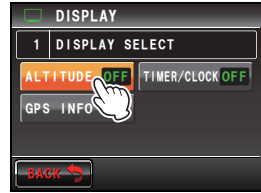**2** Touch **[DISPLAY]**

The menu list will be displayed.
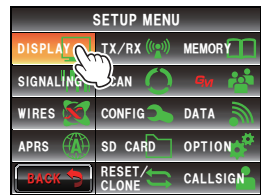
3 Touch **[1 DISPLAY SELECT]**

A list of the various screen setting selections will be displayed.

4 Touch **[ALTITUDE]** to select "ON"

Each time this symbol is touched, the setting will switch between "OFF" and "ON".

5 Press 🔲 for one second or longer

The display will return to the previous screen.

6 Press 🔲 twice briefly

The altitude graph will be displayed on the screen.

● **Changing the altitude scale**

1 Touch **[SCALE]**

Each time this symbol is touched, the scale value will change in the following order.

"5 m" → "20 m" → "40 m" → "80 m"

Tip   The maximum altitude scale will be automatically set based on the present altitude values.
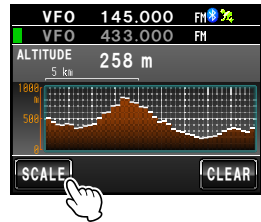
● **Erasing the previous altitude changes**

1 Touch **[CLEAR]**

The graph on the left side will disappear and the current altitude display will shift to the left end.
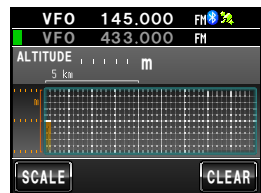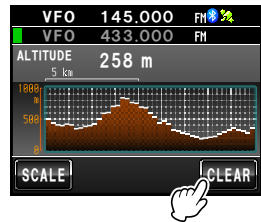
Positioning Using GPS

Other settings

● **Changing the geodetic reference system**

Select using **[CONFIG]** → **[16 GPS DATUM]** in the set-up menu.

Select the geodetic reference system which is the positioning standard.

"WGS-84": Using the global geodetic reference system for positioning. This is being used as a standard all around the world.

"TOKYO MEAN": Using the Japanese geodetic reference system for positioning. When positioning in Japan (Tokyo), the error can be lowered.

Tips

• When the geodetic reference system is changed, the position information will deviate by about 400 m.

• Set to "WGS-84" normally.

● **Changing the time zone**

Select using **[CONFIG]** → **[3 TIME ZONE]** in the set-up menu.

The time difference with the UTC (Coordinated Universal Time) can be changed in steps of 30 minutes.

Using the Smart Navigation Function

Two navigation methods may be used in the smart navigation function.

(1) Real-time navigation function

> In the C4FM digital V/D mode, the position and direction of the received partner station can be displayed in real time during the communication because the position information obtained from the GPS is transmitted at the same time as the voice signal.

(2) Backtrack function

> By registering the departure or other points in advance, the distance and direction from the current position to the registered location can be displayed in real time.

▋ Displaying the Compass screen

When using the navigation function, use the "Compass Screen" to display the direction of your station and the partner station on a compass.

1 Press 📠 for one second or longer

The set-up menu will be displayed.

2 Touch **[DISPLAY]**

The menu list will be displayed.
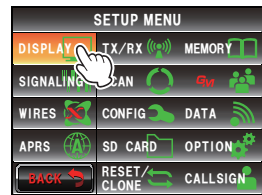
3 Touch **[2 TARGET LOCATION]** to select "COMPASS"

Each time this symbol is touched, the setting will switch between "COMPASS" and "NUMERIC".

4 Press 📠 for one second or longer

The display will return to the previous screen.

5 Press 📠 briefly

The screen with the compass panel in the center will be displayed.

The direction from your station to the partner station will also be displayed using a compass needle.

> **Tip** The compass needle will not be displayed when there is no position information.

6 Press 📠 briefly

The display will return to the normal frequency display screen from the Compass screen.

> **Tip** When the Altitude display screen and Timer/Clock screen are both "ON", the screen will change in the following order each time 📠 is pressed.
> Normal frequency display → Compass/Lat&Lon display screen → Altitude display screen → Timer/Clock screen → GPS screen

Using the GPS Function

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Using the Smart Navigation Function

● **Changing the direction of the compass panel**

The compass panel can be selected from "Heading UP" where the direction of your travel is always displayed at the top, or "North UP" where north is always displayed at the top.

1 Touch the compass needle

The compass panel will switch between "Heading UP" and "North UP" each time the compass needle is touched.

The direction of the current compass panel will be Indicated near the top left of the screen.
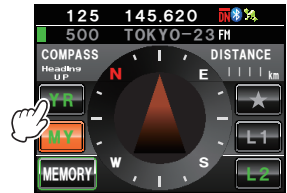
Tip

Although the scale on the compass panel has 16 directions, the compass needle can point in 32 directions.

Using the real-time navigation function

1 Switch to the Compass screen

2 Touch **[YR]**

During transmission in the V/D mode, the distance and direction of the received partner station is displayed.

> **Tip** When a partner station is selected using the GM function and displayed on the compass screen, the "●" on the left hand side of the partner station call sign will blink.
>
> When "●" is blinking, the compass display will not be updated even when signals containing position information from stations other than that displayed are received.
>
> When **[YR]** is touched, "●" will light up and the compass display will be updated when signals containing position information from stations other than that displayed are received.

Direction of partner station — Distance to partner station
Partner station information in display